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NOTES FROM PACIFIC COAST OBSERVATORIES.

AN ERROR IN RADIAL VELOCITY OBSERVATIONS ARISING FROM NON-UNIFORM SLIT ILLUMINATION.

Some observations of the planet *Venus* secured with the 3-prism Mills spectrograph attached to the 36-inch refractor give strong evidence that an imperfect or unsymmetrical illumination of the slit, by the light source, may introduce error in the resulting radial velocities. These observations were secured when the terminator of *Venus* was nearly a straight line. The slit was made parallel to the terminator, and was placed either just inside the terminator or just inside the section of the limb immediately opposite the center of the terminator, as judged from the image of the planet on the slit plates. Ten observations of the radial velocity of the planet were obtained with the slit just inside the terminator and ten with the slit just inside the limb, with the prism box and camera directed to the west. The spectrograph was then rotated 180° about the axis of the telescope until the prism box and camera pointed east, with the slit again parallel to the terminator line. In this position of the spectrograph, nine observations were made with the slit just inside the terminator, and nine with the slit just inside the limb.

In the first position of the spectrograph, that is, with camera west, the ten observed radial velocities of the limb minus the ten of the terminator had an average value of $-0.51 \pm 0.08^{\text{km}}$ per second.

In the second position of the instrument, that is with camera east, the nine observed radial velocities of the limb minus the nine of the terminator had the average value of $+0.75 \pm 0.12^{\text{km}}$ per second.

The difference of the two mean results, 1.26^{km} , is, in my opinion, attributable to the fact that the slit was not uniformly illuminated by the planet's image. Guiding was based upon a

visual image of the planet, as formed by the 36-inch objective and by a correcting lens one meter in front of the slit. This correcting lens is figured for the blue and violet rays. Guiding was chiefly by virtue of the yellow rays. The yellow image was undoubtedly larger than the blue-violet image to which the radial velocity measures were intended to relate. The slit was probably not so far inside the boundary lines of the blue-violet image as the visual guiding image indicated. It is probable that the blue-violet image was so much smaller than the guiding image that the former did not always extend entirely across the slit. The systematic errors are in the direction explainable by the assumption that in half the observations the image was stronger on the east edge of the slit than on the west edge, and *vice versa* for the other half of the observations. The slit width used was 0.0014 inch (0.036^{mm}).

Errors of the same nature probably enter into radial velocity results for stars, provided the observer in guiding upon the stellar image has a systematic tendency which leads him to keep the center of the image nearer one edge of the slit than the other, or in case the image is not symmetrical, owing to faulty collimation, atmospheric refraction, etc., or if the adjustment of the telescope is such that with the progress of time the stellar image drifts systematically off the slit in one direction.

A high degree of accuracy calls for care in the symmetry of the stellar image and symmetry of the image with reference to the central line of the slit of the spectrograph.

It is possible that atmospheric dispersion distorted the image of *Venus* sufficiently to introduce guiding errors in the radial velocities of the planet described above.

W. W. CAMPBELL.

NOTE ON COMET *a* 1915 (MELLISH).

Since the last issue of these *Publications*, a third orbit of this comet has been derived from observations of February 13th, February 27th, and March 19th, all of which were made by Dr. AITKEN.

This orbit shows a slight change from that mentioned by Dr. AITKEN in the April number of this magazine. It brings the time of nearest approach to the Sun forward to July 17th.